

REMARKS

This paper is submitted in response to the Office Action mailed October 5, 2009. Claims 1–36 are pending, and no new matter is introduced in this amendment. Applicants respectfully request entry of the amendment and reconsideration of the claims.

Rejections under 35 U.S.C. § 103

1. Claims 1–4, 6–10, 10–20, 23–26 and 28 were rejected under 35 U.S.C. § 103(a) as unpatentable over Preston (GB 2,109,357) in view of Mihaylov (US 5,447,552). Applicants respectfully traverse the rejection.

Preston discloses methods for extracting divalent metals, such as nickel, copper, cobalt, etc. from aqueous solutions with acidic pH of 2 to 4 (*see* Preston, at p. 1, ll. 42–49). The methods use organophosphorus or carboxylic acid extractants in combination with non-chelating oximes as additives to effect extraction (*see* Preston, at p. 1, ll. 34–36). Preston also discloses the use of other synergistic additives, such as tri-n-butyl phosphate (TBP) (*see, e.g.*, Preston, at p. 2, Table 2), but does not suggest using synergistic additives (i.e. oximes and accelerators) together.

Mihaylov describes a process for the hydrometallurgical recovery of metals from aqueous feed solutions (*see, e.g.*, Mihaylov, at col. 1, ll. 10–14). The feed solution is contacted with water-immiscible organic phase containing an extractant to load the metal ions to form a metal-bearing organic phase. The organic phase is then separated from the aqueous phase and contacted with a strip solution to recover metals (*see generally* Mihaylov, at col. 3, l. 54 to col. 4, l. 5).

Claim 1 recites a process for the separation of nickel, cobalt or both from impurity elements selected from one or more of calcium, magnesium, manganese and chloride contained in a leach solution. The steps of the process include contacting the leach solution with a solvent extraction solution that includes a carboxylic acid, an aliphatic hydroxyoxime and a kinetic accelerator. Claims 2–36 depend from claim 1 and incorporate all the limitations thereof.

To make a *prima facie* case of obviousness, the teachings of the prior art must suggest the claimed subject matter to a person of ordinary skill in the art, and all the claim limitations must be taught or suggested in the references cited by the Examiner. *In re Kotzab*, 217 F.3d 1365, 1370 (Fed. Cir. 2000). As articulated by the Supreme Court in a recent case, a combination is obvious if it is no more than the predictable use of known elements according to their established functions; and there was a reason to combine the known elements. *KSR Intl Co. v. Teleflex, Inc.*, 550 U.S. 398 (2007). However, to make a *prima facie* case of obviousness, "it remains necessary to identify the reason why a person of ordinary skill in the art would have combined the prior art elements in the manner claimed." *Id.* The initial burden to make a *prima facie* case of obviousness is on the Examiner. *In re Bell*, 991 F.2d 781, 783 (Fed. Cir. 1993).

Applicants submit the combination of Preston and Mihaylov does not teach or suggest all the limitations of the present claims. The present claims are directed to methods using a solvent extraction solution that includes a carboxylic acid, an aliphatic hydroxyoxime and a kinetic accelerator, but Preston fails to teach or suggest use of a hydroxyoxime. Preston describes tests using non-chelating oximes of the general formula $R.CHOH.R'$, where R and R' are hydrogen, alkyl, or aryl groups, but not -OH (*see* Preston, at p. 3, Table 2). Therefore, Preston does not teach or suggest a method for metal extraction that uses carboxylic acid, hydroxyoxime and a kinetic accelerator in one step, as recited in the present claims.

The deficiencies of Preston are not cured by Mihaylov. The Examiner contends that "the references teach the use of the acid, oxime and accelerator in this process" and therefore, it would have been obvious to the skilled artisan to use them at the same time in the leach process. Applicants disagree with this contention and submit that both Preston and Mihaylov teach away from the use of chelating hydroxyoximes for the separation of nickel, cobalt or both, as recited in the present claims. Preston notes that using LIX63 (a chelating α -hydroxyoxime) is of little practical use because the extraction of nickel is too slow (*see* Preston, at p. 2, ll. 63-65). Mihaylov states that "once loaded into these chelating oximes, cobalt (II) tends to oxidize to cobalt (III), which adversely affects stripping and may degrade the oxime reagent (*see* Mihaylov, at col. 2, ll. 23-26). Mihaylov confirms that the rate for nickel extraction using chelating hydroxyoximes is very slow (*see* Mihaylov, at col. 2, ll. 26-28).

Therefore, as both Preston and Mihaylov disparage the use of chelating hydroxyoximes in a process to extract cobalt and nickel, a person of skill in the art would not be motivated to modify the teaching of Preston and Mihaylov to arrive at the invention of the present claims, i.e. a process using a solvent extraction solution that includes an acid, a kinetic accelerator and a hydroxyoxime.

As all the limitations of claim 1 are not taught or suggested in the combination of Preston and Mihaylov, the claim is not *prima facie* obvious. The rejection of the claim under 35 U.S.C. § 103(a) as obvious over the combination of Preston and Mihaylov is not warranted, and Applicants respectfully request withdrawal of the rejection.

Claims 2-4, 6-10, 10-20, 23-26 and 28 depend from claim 1 and incorporate all the limitations thereof. Therefore, these claims are not *prima facie* obvious over the combination of Preston and Mihaylov, for substantially the same reasons as indicated above for claim 1. Withdrawal of the rejection with respect to these claims is respectfully requested.

With respect to claim 21, which was rejected over Preston and Mihaylov as applied to the above claims, Applicants submit the claim depends from claim 1 and is not *prima facie* obvious over the combination of Preston and Mihaylov, for substantially the same reasons as indicated above for claim 1. Withdrawal of the rejection with respect to claim 17 is respectfully requested.

2. Claims 1, 2, 4-7, 14, 15, 16, 22, 23, 26, 27, 30, 31 and 36 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Cheng (WO 02/22896) in view of Mihaylov. Applicants respectfully traverse the rejection.

Cheng describes a process for separating cobalt, nickel or both from a leach solution using separate solvent extraction steps with a carboxylic acid, an organophosphoric acid and an organophosphinic acid (*see* Cheng, at p. 4, ll. 1-6). Non-chelating oximes can be used as "synergists" in the process. The reference defines oximes to include structures where -OH substituents are present on the oxime nitrogen, but does not include α -hydroxyoximes (*see* Cheng, at p. 8, ll. 9-15).

Mihaylov describes a process for the hydrometallurgical recovery of metals from aqueous feed solutions. The feed solution is contacted with water-immiscible organic phase containing an

extractant to load the metal ions to form a metal-bearing organic phase. The organic phase is then separated from the aqueous phase and contacted with a strip solution to recover metals.

Applicants submit the combination of Cheng and Mihaylov does not teach or suggest all the limitations of the present claims. The present claims are directed to methods using a solvent extraction solution that includes a carboxylic acid, an aliphatic hydroxyoxime and a kinetic accelerator, but Cheng fails to teach or suggest use of a hydroxyoxime. The reference defines oximes to include structures where -OH substituents are present on the oxime nitrogen, but does not include α -hydroxyoximes. Therefore, Cheng does not teach or suggest a method for metal extraction that uses carboxylic acid, hydroxyoxime and a kinetic accelerator in one step, as recited in the present claims.

The deficiencies of Cheng are not cured by Mihaylov. The Examiner contends that it would have been obvious to the person of skill in the art to combine Cheng and Mihaylov, because Mihaylov teaches the oxime process and Cheng teaches an oxime with a hydroxy group attached. Applicants disagree with this contention and submit that Mihaylov teaches away from the use of chelating hydroxyoximes for the separation of nickel, cobalt or both, as recited in the present claims. Mihaylov states that "once loaded into these chelating oximes, cobalt (II) tends to oxidize to cobalt (III), which adversely affects stripping and may degrade the oxime reagent (*see* Mihaylov, at col. 2, ll. 23-26). Mihaylov also notes that the rate for nickel extraction using chelating hydroxyoximes is very slow (*see* Mihaylov, at col. 2, ll. 26-28).

Therefore, as Cheng does not teach or suggest use of chelating hydroxyoximes, and Mihaylov disparages the use of chelating hydroxyoximes in a process to extract cobalt and nickel, a person of skill in the art would not be motivated to modify the teaching of Cheng and Mihaylov to arrive at the invention of the present claims, i.e. a process using a solvent extraction solution that includes an acid, a kinetic accelerator and a hydroxyoxime.

As all the limitations of claim 1 are not taught or suggested in the combination of Cheng and Mihaylov, the claim is not *prima facie* obvious. The rejection of the claim under 35 U.S.C. § 103(a) as obvious over the combination of Cheng and Mihaylov is not warranted, and Applicants respectfully request withdrawal of the rejection.

Claims 2, 4–7, 14, 15, 16, 22, 23, 26, 27, 30, 31 and 36 depend from claim 1 and incorporate all the limitations thereof. Therefore, these claims are not *prima facie* obvious over the combination of Cheng and Mihaylov, for substantially the same reasons as indicated above for claim 1. Withdrawal of the rejection with respect to these claims is respectfully requested.

With respect to claim 17, which was rejected over Cheng and Mihaylov as applied to the above claims, Applicants submit the claim depends from claim 1 and is not *prima facie* obvious over the combination of Cheng and Mihaylov, for substantially the same reasons as indicated above for claim 1. Withdrawal of the rejection with respect to claim 17 is respectfully requested.

3. Claims 11–13 and 18 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Preston in view of Mihaylov and further in view of Davis (US 4,104,359). Applicants respectfully traverse the rejection.

The discussion of Preston and Mihaylov as applied to claim 1 above is fully incorporated herein to avoid duplication. Briefly, as both Preston and Mihaylov disparage the use of chelating hydroxyoximes in a process to extract cobalt and nickel, a person of skill in the art would not be motivated to modify the teaching of these references to arrive at the invention of the present claims, i.e. a process using a solvent extraction solution that includes an acid, a kinetic accelerator and a hydroxyoxime. Indeed, Preston describes using either TBP (i.e. a kinetic accelerator) or an oxime as separate additives. Therefore, there is nothing in the combination of Preston and Mihaylov to suggest using an acid, a kinetic accelerator and a hydroxyoxime together in the described process.

The deficiencies of Preston and Mihaylov are not cured by Davis. Davis discloses use an organic liquid extractant that includes an oxime selected from ketoximes and α -hydroxyoximes. However, there is no disclosure in Davis of using an acid, a kinetic accelerator and a hydroxyoxime together in the described process. Therefore, the disclosure in Davis would not motivate the person of skill in the art to modify the process disclosed in Preston and Mihaylov to arrive at the method of the present claims.

Claims 11–13 and 18 are therefore not *prima facie* obvious, and the rejection over Preston, Mihaylov and Davis under 35 U.S.C. § 103 is not warranted. Withdrawal of the rejection is respectfully requested.

4. Claims 29, 32 and 33–35 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Cheng in view of Mihaylov and further in view of Hummelstedt (US 4,120,817). Applicants respectfully traverse the rejection.

The discussion of Cheng and Mihaylov as applied to claim 1 above is fully incorporated herein to avoid duplication. Briefly, Cheng does not teach or suggest use of chelating hydroxyoximes, and Mihaylov disparages the use of chelating hydroxyoximes in a process to extract cobalt and nickel, a person of skill in the art would not be motivated to modify the teaching of Cheng and Mihaylov to arrive at the invention of the present claims, i.e. a process using a solvent extraction solution that includes an acid, a kinetic accelerator and a hydroxyoxime. Furthermore, the method disclosed in Cheng uses separate solvent extraction steps, unlike the present claims. Therefore, there is nothing in the combination of Cheng and Mihaylov to suggest using an acid, a kinetic accelerator and a hydroxyoxime together in a single step of the method.

The deficiencies of Cheng and Mihaylov are not cured by Hummelstedt. Hummelstedt describes an extractant that includes at least one strong organic acid affecting the phase interface tension and accelerating conversion from one phase to another. However, there is no disclosure in Hummelstedt of using an acid, a kinetic accelerator and a hydroxyoxime together in the described process. Therefore, the disclosure in Hummelstedt would not motivate the person of skill in the art to modify the process disclosed in Cheng and Mihaylov to arrive at the method of the present claims.

Claims 29, 32 and 33–35 are therefore not *prima facie* obvious, and the rejection over Cheng, Mihaylov and Hummelstedt under 35 U.S.C. § 103 is not warranted. Withdrawal of the rejection is respectfully requested.

SUMMARY

In view of the above amendments and remarks, Applicants respectfully request a Notice of Allowance. If the Examiner believes a telephone conference would advance the prosecution of this application, the Examiner is invited to telephone the undersigned at the below-listed telephone number.

Please charge any additional fees or credit any overpayment to Merchant & Gould P.C.,
Deposit Account No. 13-2725.

Respectfully submitted,

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